



Rump Session: Advanced Silicon Technology Foundry Access Options for DoD Research

Prof. Ken Shepard

Columbia University

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A red-tinted, high-contrast image of a microchip circuit board, showing various components and traces. The text is overlaid on this image.

Daunting challenge of fab access for U. S. universities

Ken Shepard
Department of Electrical Engineering
Columbia University



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Requirements

- U. S. universities must have access to semiconductor processing technologies to validate designs and innovate
- General needs require access to:
 - General CMOS technology nodes
 - Bleeding edge technology to explore latest issues: variability, highest frequency performance
 - More general CMOS node to explore mixed technologies and alternate applications
 - Specialized needs to SiGe, MEMS
- In some cases, in which large systems are explored, large silicon areas are required

Fabrication alternatives for U. S. universities

5 mm x 5 mm 0.13 μ m CMOS

- **MOSIS**

- \$72,500 for university pricing (TSMC)

- **Europractice**

- 27,400 Euros (\$34,689) (UMC)

- **TAPO with 1/3 pricing (on DoD funded programs only)**

- \$43,000 (IBM)

- **CMP**

- 33,250 Euros (\$42,106) (STM)

MOSIS has a 5 mm x 5 mm minimum. Both CMP and Europractice allow smaller dice to be fabricated with almost linear cost scaling.

Fabrication alternatives for U. S. universities

12 mm² 65-nm CMOS

- **MOSIS**

- \$99,000 (IBM)

- **Europractice**

- Not available.

- **TAPO with 1/3 pricing (on DoD funded programs only)**

- ~ \$60,000 (IBM)

- **CMP**

- 93,000 Euros (\$117,900) (STM)

MOSIS has a 12 mm² minimum. CMP allows smaller dice to be fabricated with almost linear cost scaling.

Other programs

- SRC offers a match for MOSIS fabricated runs but this is capped at \$24K. Must be an SRC GRC-funded project. Very limited funds.
Also, revised minimums and pricing (for SRC projects only)
 - IBM 130nm (8RF-DM) (min) 4 sq mm \$10K
 - Europractice: \$3790 (but only a 2.3 mm² block); CMP: \$11,557
 - IBM 90nm (9SF, 9RF/LP) (min) 4 sq mm \$25K
 - Europractice: \$9160 (but only a 3.5 mm² block); CMP: \$25,327
 - IBM 65nm (10SF, 10LP) (min) 4 sq mm \$48K
 - Europractice: Not available; CMP: \$48,127
- Both UMC and TSMC offer free shuttle runs to U. S. universities on a limited basis.
 - Complex relationship with the foundries with sticky IP arrangements and lots of trips to Taiwan.
- Some U. S. faculty with ties to China are getting free fab through SMIC (Shanghai), which offers technologies down to 65-nm CMOS



International competitive landscape

- Taiwanese universities have almost “all you can eat” access to TSMC and UMC foundry.
- Chinese universities have a similar relationship with SMIC, many involved with large government “competitiveness” projects – “replacement” for Intel microprocessor
- European Union subsidizes Europractice, but until recently, U. S. has had almost the same access as Europeans (this may change).

Opportunities...

- TAPO program is fully funded for U. S. universities participating in DoD-funded (or DARPA-funded) research on a vetted basis.
- Are there opportunities to leverage the Albany Nanotech facility? NYS has already invested billions in this enterprise.
- Bottom line: There needs to be a solution here that is on a par with our Asian competitors.